KnE Life Sciences

Amphibian and Reptiles Anomalies and Pathology
The Second International conference
"Amphibian and reptiles anomalies and pathology: methodology, evolutionary significance, monitoring and environmental health"
Volume 2018

Knowledge E
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Conference Paper

New Occurrences of Anomalous Specimens of Anuran Amphibians in Northwest Upper Poochye

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Abstract

New data about anomalous amphibian specimens in northwest Upper Poochye are provided. We found anomalies like anophthalmia, dyscoria, corectopia and abnormal patterns.

Keywords: northwest Upper Poochye, anomalies, anura.

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Received: 23 January 2018
Accepted: 20 April 2018
Published: 3 May 2018

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the Amphibian and Reptiles Anomalies and Pathology Conference Committee.

1. Introduction

Anuran amphibians are well-explored in northwest Upper Poochye with respect to their faunistics and ecology [1]. Recently, new data were obtained about their nutritional biology, fecundity, anthropogenic pressure and other aspects of amphibian biology [2, 3, and 4]. However, there are few papers about anomalous specimens of anuran amphibians in this region.

Usually two groups of morphological deviations are distinguished: a) those produced by disturbance of morphogenetic processes; b) traumatic ones. However, in reality it is difficult to "atypical morphologies" into two different kinds, particularly in the field [5]. Equally, scientific positions about the origin of anomalies vary [6].

The aim of this paper is to summarise the data about new catches of anomalous specimens of anuran amphibians and to clarify the localities of catches and the names of anomalies from our previous paper [7].

2. Methods

Amphibians were collected during their active periods between 2011 and 2014. They were caught with pitfall traps on land and with nets in the water [8]. We took as our framework the classification of amphibian anomalies proposed by Nekrasova [9] and Vershinin [10]. Genetic typing of the water frogs to determine whether their mitochondrial and nuclear DNA haplotypes fell into the "Western" or "Eastern" forms was performed with the procedure used by Zaks and collaborators [11].

3. Results

Anophthalmia (Fig. 1) was detected in a singular specimen of the European Fire-bellied Toad (*Bombina bombina* (L.)) collected in 2011 in xeric grassland near Tish Lake, N54°21′46.0" E36°08′24.3". It was a specimen with a defective eye. It constituted 3.1% of the sample of this species in this locality, or 0.3% of all specimens from the region.

Dyscoria and *Corectopia* (Fig. 2) were detected in a singular specimen of the Edible Frog *Pelophylax esculentus* (L.)). It was caught in 2014 in a very eutrophic oxbow lake of Ugra River, N54°40′37.17" E35°55′39.15". It was probably triploid. This anomaly was shown by a decreased and atypical left pupil dislodged from the dorsolateral fold towards the dorsal part. Morphometric measures identified this specimen as the Marsh Frog *P. ridibundus* (Pallas). Via molecular analysis, we found that the mitochondrial DNA of this frog was a haplotype of the "Western" form of the Marsh Frog, and its nuclear DNA originated from the "Eastern" form of the Marsh Frog and the Pool Frog (*P. lessonae* (Camerano)). The abundance of the RE complex among water frogs in this habitat was low – 4.2 specimens per 100 m. In total, this anomaly amounts to 4.7% of all specimens of Edible Frogs caught in the region. This anomaly is singular in other regions of Russia (the Mari El Republic [12] and Samara oblast (unpublished data of the authors)).

An *abnormal pattern* (Fig.3) was detected in a specimen of the Pool Frog (*P. lessonae* (Camerano) collected in June 2014 in a waste deposit belonging to the "Aromasynthes" Company, N54°35′39.44" E36°21′00.80". It amounts to 10% of the specimens from this locality and 0.9% of all pool frogs caught in the region. The anomaly is located on the dorsal right part of the femur and tibia and close to the contact point of the

femur with the corpus. It was covered with dark spots, which were of great size, well-connected and asymmetrical, although their color was typical of water frogs. There was a noticeable enlarged spot on the margin of dorsolateral fold.

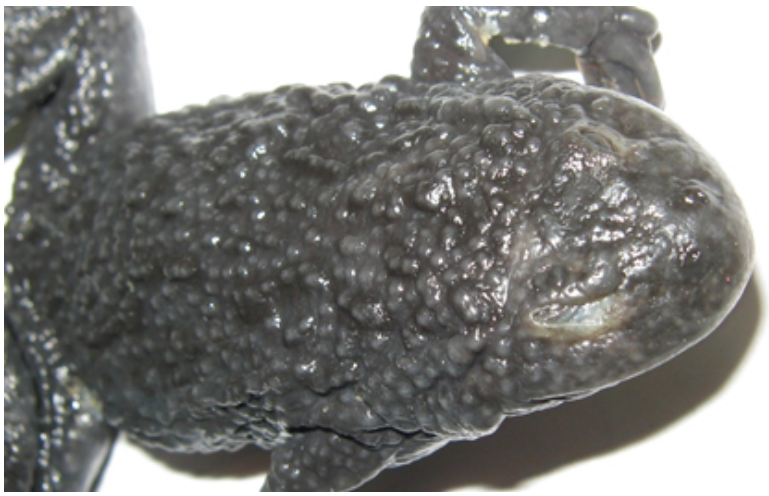

Figure 1: *Anophtalmia* in the European Fire-bellied Toad.

Figure 2: *Dyscoria* and *corectopia* in the Edible Frog.

According to Nekrasova [13], anomalies in amphibian coloration are possibly explained by the effects of many physical, chemical and biological factors in wetlands. In our data, the anomalous amphibian specimen was found in the waste deposit belonging to the "Aromasynthes" Company, where the phenol concentration in water was 4,000 times greater than its background concentration and where the iron concentration was 16 times greater [14].

This kind of anomaly was also detected in a Pool Frog specimen in 2014 in a pond near Gordikovo, N54°12'11.23" E36°09'27.35". The specimen had distinct grey spots around dark "maculate" spots – two on the right dorsal part of the corpus and one

Figure 3: *Abnormal pattern* in the Pool Frog.

on the femur. It constituted 10% of the sample from this locality and 0.9% of total number of pool frogs caught from the region.

Below, we give a checklist of the anomalies from our previous paper [7] with corrections and the geographic coordinates of localities.

Polymelia: a froglet specimen of the Marsh Frog, N54°30′04.50″ E36°19′52.24″.

Xanthic: a froglet specimen of the Pool Frog, N53°46′47.29″ E35°42′30.83″.

Oligodactyly: one specimen of the Common Frog (*Rana temporaria*Linnaeus, 1758), N53°46′53.50″ E35°44′12.69″.

Macrophthalmia: one specimen of the Common Toad (*Bufo bufo* (Linnaeus, 1758)), N53°46′39.81″ E35°43′48.40″.

Curved jaw: 6 specimens of the Common Toad, N53°46′39.81″ E35°43′48.40″.

In the Volga region, there were varied data on the frequancy of anomalies among water frog species. So, in the Mari El Republic the Pool Frog had the highest number of kinds of anomalies and the Edible Frog had the lowest. In the Middle Volga region and in the Republic of Tatarstan, the Marsh Frog had the greatest percentage of deviations [15, 16, and 17]. The difference among water frog species probably can be explained by their complex genetic structure, which is characterised by a nonequal distribution of "Western" and "Eastern" forms of the Marsh Frog in European Russia [11, 18, and 19]. This problem needs to be surveyed in the future.

4. Conclusion

All the explored amphibian anomalies, including those from our previous paper [7], are background anomalies according to LJ Borkin and collaborators [20]. Only two kinds of anomalies were found in urban areas – *polymelia* in one specimen and *abnormal patterns* in one specimen. Consequently, we could not describe any trends in anomaly frequency in relation to anthropogenic pressure.

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